# Output format for the delivery in the EURODELTA3-Phase 2 (Retrospective Analysis) database

Updates 20150331

Updates 20150323

Updates 20150312

The output format is the same as for earlier Eurodelta exercises, using a common netcdf format and output at the 1st modelled level. Participating groups can provide either model output at the first model level, or downscalled vertically as long as the downscaling procedure is clearly documented.

The following will be delivered to the project ftp server (hosted by Ineris under moca/outputs/ED/2d/yourModel):

* Daily concentrations
  + NO3, NH4, SO4, NA-B (sea salt), NA-A (anthrop), DUST, TPPM (Primary inorganic and organic species, including EC), ASOA, BSOA, all as both -25 and -10
  + PM10, PM2.5
  + NH3, SO2, APINEN, ISOP, HNO3, H2O2, HCHO, PAN, VOC, BVOC
  + O3max (based on backwards 8-hr running means), O3mean
* Hourly concentrations and meteorology
  + O3 , NO2
  + PBL
* Monthly deposition
  + Dry dep. : DSOx, DNOx, DNHx
  + Wet dep : WSOx, WNOx, WNHx

Local storage (not to be delivered on INERIS’ ftp but kept on the local machines of modelling teams):

* PM10, PM2.5, and if possible Nitrate, Ammonium, Sulphate, SOA on an hourly basis

The results of the modelling part of the Trend analysis are going to be used in two ways:

* To analyse the trends over the period of 21 years (1990 – 2010)
* To analyse the uncertainty due to changes in Meteorology, Boundary Conditions, and Emissions

The file naming should contain information about Model name, Trend grid, Species, Time Frequency, Meteorological year, year of Boundary conditions, and year of Emissions.

* Participating models are EMEP, CHIMERE, LOTOS-EUROS, CAMx, CMAQ, MINNI, RCGC and CEREA-POL’AIR, which will be abbreviated as follows:

EMEP, CHIM, LOTOS, CAMX, CMAQB, CMAQH, MINNI, RCGC and POLR,

where CMAQB and CMAQH refer to the Barcelona and the Hamburg group respectively.

* The Trend modelling grid is named EDT
* The species names for archiving are as follows (for the list of data to be delivered on the project ftp at this stage see the above list):

Meteo: KZ, PBL, RAIN, T2M, U10 as the horizontal wind module, USTAR

Gas: APINEN, H2O2, HCHO, HNO3, ISOP, NH3, NO, NO2, O3, PAN, SO2, VOC

PM25: PM25, [ASOA, BSOA, DUST, EC, NA-A, NA-B, NH4, NO3, OPOM, OPPM, SO4]-25

PM10: PM10, [ASOA, BSOA, DUST, EC, NA-A, NA-B, NH4, NO3, OPOM, OPPM, SO4]-10

Dep: DNHx, DNOx, DSOx, WNHx, WNOx, WSOx

Units: If not obvious (ex PBL in m), all variables are in ug/m3 (using synchronous model pressure and temperature if a conversion is needed). Depositions are in mgS/m2 or mgN/m2,RAIN in mm/day (daily total)

* Time frequency: HL (hourly), DL (daily), ML (monthly)

Delivered model result files must be of netCDF format and must have the following generic naming:

ED\_*model*#MyyByyEyy\_EDT\_*species*\_*freq*.nc

with

ED\_*model*#Yyy\_ EDT \_*species*\_*freq*.nc (for Tier 1A and Tier 3A

and

ED\_*model*#YyyE10\_ EDT \_*species*\_*freq*.nc (for Tier 3B

where Yyy stands for the Trend year, Myy for the meteorological year, Byy for the year of boundary conditions, and Eyy for the year of emissions.

yy=[90,91,92,93,94,95,96,97,98,99,00,01,02,03,04,05,06,07,08,09,10]

Examples: ED\_CHIM#Y90\_ EDT \_SO4-10\_DL.nc => for the Tier 1A case

ED\_EMEP#M10B10E90\_ EDT \_NO2\_HL.nc => for Tier 1B

ED\_LOTO#M10B90E90\_ EDT \_ISOP\_DL.nc => for Tier 2A

ED\_CMAQB#Y08\_ EDT \_WSOx\_ML.nc => for Tier 3A

ED\_POLR#Y04E10\_ EDT \_WSOx\_ML.nc => for Tier 3A

HL for the species: PBL, O3, NO, NO2, PM10, PM25

ML for all depositions (cumulated over the month)

DL for all the other species, for ozone, in addition to daily mean (O3mean), provide daily max after having applied a backward 8-hr running mean (as O3max) defined as O3(12h)=[ O3(12)+O(11)+...+O(5) ]/8

For the preliminary simulations using EMEP emissions use: ED\_*model*#Yyye\_EDT\_*species*\_*freq*.nc

The netCDF variables in the nc file are

* species (nx,ny,ntime) – species as above
* lon(nx,ny), lat(nx,ny)
* dimensions are nx=143, ny=153, ntime = 8760/365/12 or 8784/366/12 for a leap year.

Delivery of the results to the Ineris server moca/outputs/ED/2d/yourModel.

A number of EuroDelta QC programs will be adapted for a first screening of the results.

If ok, the results will be moved to the EDTrend database on the Ineris server.

Tool for evaluation/visualization the results

A multi-pollutant (Gases, PM, PM components, Depositions, Indicators), multi-geometry (Europe, Countries, Regions, Cities, Stations), and multi-indicators Tool for the inter-comparison of modelled trends over the period 1990 – 2010 has been developed. The Tool produces line trends and 2d maps of trends, on which observational data and emission data could be superimposed. Model output from the ED Trend exercise is direct Input to the Tool. The Tool is based on earlier work on model inter-comparisons in the frame of CityDelta, EuroDelta, POMI, HTAP, and Delta.

The Tool can also be used for the analysis of sensitivity of model trend results with respect to Meteorology, Boundary Conditions, and Emission.  
The Tool (including some preliminary model results) will be made available to the EuroDelta/TFMM community through the JRC-DELTA website. The Tool could serve as a common framework for (modelled) trend visualization/analysis/ evaluation. The Tool is IDL-based and makes use of the IDL- Virtual Machine (public-domain software). An easy to use installation procedure will be provided as well.